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"Internationalization in Criminal Markets"

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Internationalization in Criminal Markets

Abstract

Using a panel data set, we examine the factors that favor the occurrence of foreign organized crime and its cooperation with domestic organizations in Italy. By means of an OLS regression model, we find that foreigners act independently in regions with bigger migrant network and low criminal market concentration. Cooperation is again negatively affected by market concentration and appears to positively related to the ratio of immigrant population. A variety of checks show the robustness of our outcome.

Keywords: Organized Crime

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1 Introduction

Organized crime can be defined as groups with formalized structure that threaten peace, violate human rights and undermine civil and economic development of societies with the primary objective to obtain money through illegal activities (UNODC, 2016; FBI, 2016). Modern organized crime can be split up into subversive groups and mafia and non-mafia organizations. In spite of ongoing global investigations against the spread of organized crime, its dimensions have developed to levels comparable to those of transnational corporations (Williams, 1994). Italian organized crime alone is estimated to have a turnover of more than $100 billion per year and is declared as clear threat to the European Union (FBI, 2016; Europol, 2013). From a personnel point of view, Italian criminal organizations are assessed to have approximately 25,000 members in Italy and about 250,000 affiliates spread over Italy, the rest of Europe, the Americas and Australia. Williams (1994) states that the emerging openness in the second half of the twentieth century has created unprecedented opportunities and facilitated the transnational expansion for organized crime. The width of businesses that are intertwined with organized crime is enormous and the activities range from simple racketeering to the corruption of the highest political institutions. A story of Italian Newspaper *La Stampa*[1] reports of arms deals in trade for antique

[1] Quirico, Domenico. 2016. "Arte antica in cambio di armi, affari d'oro in Italia per l'asse fra Isis e 'ndrangheta." *La Stampa,* October 16. http://www.lastampa.it/2016/10/16/esteri/arte-antica-in-cambio-di-armi-affari-doro-in-italia-per-lasse-fra-isis-e-ndrangheta-x9uX3cnjg6B3BhbIe4nTKK/pagina.html

cultural assets between Calabrian 'Ndrangheta and ISIS, where also Russian and Chinese criminal organizations are involved. According to Franco Roberti (2014) the size of the impact of transnational organized crime is very likely consequence of a deliberate strategy. Criminal organizations are well structured and follow strategies and can thus be compared behaviorally to legal corporations and examined by standard tools (Becker, 1968). The destructive consequences of organized crime are of tremendous magnitude. Daniele and Geys (2015) show that the presence of mafia-related violence causes a lower level of politician's human capital and consequently leads to lower quality of institutions and political decisions. Thereby, organized crime undermines political structures and the social order of countries, which is a challenge to state sovereignty and authority (Shelley, 1995; Williams, 1994). Related to political quality and the presence of organized crime is the loss of economic growth. Foreign investors see crime as a business obstacle and deterring factor for investments, affecting both employment and economic development negatively. The presence of mafia can be seen as a comparative disadvantage for affected regions (Krkoska and Robeck, 2006; Daniele and Marani, 2011). Instead of more profit- and growth-oriented private investors, the Italian government is investing in economically weakened regions. Pinotti (2012) shows that the substitution of private capital with less productive public investment leads to a significant reduction of per capita income. For existing firms, organized crime is creating significant additional costs: payments for protection, limitation of

entrepreneurial potentials, increased cost of credits and distorted loan conditions, destruction and migration of talent, and unfair competition with mafia-owned legal businesses (Bonaccorsi di Patti, 2009; Champeyrache, 2015; Konrad and Skaperdas, 1998). According to Champeyrache (2000), organized crime's strategy is long-ranging and opting for a combination of legal and illegal activities.

The existence of organized crime can be explained by a power vacuum and lacking ultimate enforcement, stemming for instance from geographic distance or political change, as it was the case in Sicily in the 19th century, where one of the first Italian criminal organizations arose (Skaperdas, 2001). The vacuum is replaced by competing gangs, which fight for their turfs, where they can use their monopoly power to earn profits through protection money and extortion. In the case of Italy, this geographical rivalry used to occur largely in the southern regions, where the traditional criminal organizations are based (Mafia in Sicily, 'Ndrangheta in Calabria, and Camorra in Campania).

Over the last decades, Italian criminal organizations have expanded their business activities within Italy and over the globe. Nonetheless, foreign criminal organizations have managed to develop in Italy and represent additional players in the domestic market. Since the beginning of the 1990's, Italy has noticed a strong increase of immigrants as a consequence of the fall of the Berlin Wall and wars in former Yugoslavia. In spite of a widespread connotation between immigration and crime, Bianchi et al. (2012) found that the

overall, not merely organized, crime rate in Italy was not significantly related to the size of immigrant population for the period from 1995–2003. Still, it is interesting to examine the connection of the level of immigrant population with the presence of foreign criminal organizations. In this paper, we want to elaborate an econometric model to test factors that favor the presence of foreign organized crime in Italy. A trend that can be observed for immigrants' behavior is that they tend to settle in locations, where people of the same national background are more numerous (Bianchi et al., 2012).

Based on the topics of previous research we want to focus on the occurrence of foreign organized crime and the incidence of cooperation between foreigners and Italians through an empirical approach. In the following section, we will elaborate the hypotheses for our investigation. In section 3, we will present the underlying data for the analysis and describe the methodology and the main manipulative operations that were conducted in order to run a stable analysis. Section 4 will present the empirical model and the results. Section 5 will follow with the interpretation of the empirical results for the two dependent variables and a sample manipulation and variation of dependent variables as robustness checks. Section 6 will then sum up the outcomes and give recommendations for future research.

2 Hypotheses

As we mentioned before, criminal organizations can be analyzed by standard economic tools, which applies also for their choice of market entry. Ghemawat's (2001) framework

to capture distance dimensions between countries delivers a solid explanation for the choice of locations with a bigger common population group, where cultural compliance is higher through other immigrants. Zaheer (1995) explains this by the "liability of foreignness", meaning the merely fragmentary information about local rules and behaviors and missing legitimacy and trustworthiness to operate in the new market. Thus, it seems logical that firms, in our case illicit firms, are more active in regions with higher migration rate. In Italy, the ratio of immigrants is highest in the northern, specifically north-eastern regions, which can be explained by the geographic proximity to Balkan States (Del Boca and Venturini, 2003) and, relatively to the southern regions, higher income and employment opportunities. Additionally, a favoring factor for the entry and spreading of foreign organized crime in the north is the fact that traditional organizations are less influential than in the south. Not to say that northern Italy is not affected by Italian organized crime. Yet, it tends to operate even more cautiously to remain undetected outside its territory, where political influence might be lower. However, since criminal organizations' power is based on the control of a specific area, the chances for foreigners to enter and succeed are higher in the north. Summing up the previous remarks, we may hypothesize that foreign organized crime is occurring in areas, where the ratio of immigrants is relatively higher. This is due to the reduction of the liability of foreignness and the advantages of an existing network of compatriots, which is likely to facilitate the establishment of (illicit) business operations. Moreover, we expect foreign criminals to be active in geographical areas, where

the criminal activities are not concentrated on one single player, but spread over a multitude of criminal groups. As for legal markets, non-dominant players have less possibilities to deter the market entry of a new competitor. Thus, less concentrated markets provide more promising opportunities for a successful market entry for foreign groups. In summary, we will run the examination taking into account the following hypothesis.

> *Hypothesis 1: Foreign organized crime is (a) significantly and positively related with the share of immigrants in a geographical area and (b) shows a significant negative correlation with the level of concentration within a criminal market.*

As previously mentioned, Italian organized crime is known to collaborate with other international groups (Quirico, 2016; FBI, 2016). This collaboration occurs on an international level, but also within the Italian borders. Since we examine the behavior of foreign criminal groups in Italy, it is also interesting to have a look at possible factors that may foster cooperation between Italian and foreign criminal groups in Italy. Legal firms cooperate, when their individual utility of cooperation is higher than in a competitive situation. For illicit organizations, we can think of the same incentives. For instance, in a competitive market, where individual market shares are low, no single player has the power to increase profits. Through collusion with competitors, this status may be evaded. Furthermore, previous literature has pointed out that organized crime is based on market power. In less concentrated markets, neither foreign nor Italian organizations have a strong power due

to higher market fragmentation and thus a higher number of competitors. As for cooperation between the two groups, we thus would expect a higher cooperation level when market concentration is low. For foreign crime alone, we expect a positive connection with the level of migration due to migrant network effects. By cooperating with Italian groups, foreigners can replace this network effectively and skip the liability of foreignness. Hence, other than for foreign crime, we expect cooperative operations not to be correlated with the level of migrants. Finally, for cooperation we come up with

> *Hypothesis 2: Foreign and Italian organizations' cooperation is (a) not significantly related with the share of immigrants in a geographical area and (b) shows a significant negative correlation with the level of concentration within a criminal market.*

3 Methodology

For the examination of our hypotheses on the two sorts of crime, we have assembled data on crime for 101 Italian provinces during the period 2007 – 2010[2]. The underlying data about organized criminal activity was taken from the Italian anti-mafia investigative authority (*Direzione investigativa antimafia* [DIA]), which is documenting organized-crime related felonies and releasing a report biannually. The used documents contain single op-

[2] In 2009 and the following year, five new provinces were created by secession. In order to maintain a consistent classification, we attribute the new provinces to the original layout.

erations and the associated information about location and type of crime, clan involvement, and number and nationality of the accused. Thereby, Aquilante and Maretto (2016) have obtained a dataset with 1857 operations and dummy variables for the previously mentioned information. With the underlying information about the accused' nationalities, we were able to create dummies to classify the involved parties into home groups, accounting for involved Italians, and foreign groups, accounting for involved foreigners. A dummy variable for cooperation was generated to indicate operations with contemporaneous involvement of both groups. For observations, where either only home or only foreign individuals were involved, we created another specific dummy. The variables are denoted *hg, hg_only, fg, fg_only* and *coop*, respectively. In addition, the previous five dummies were multiplied with the number of involved persons per operation in order to obtain an indicator for the size of an operation. Corresponding to the underlying dummies, the variables are denoted *hg_pers, hg_o_pers, fg_pers, fg_o_pers* and *coop_pers*.

Furthermore, socioeconomic and demographic data was gathered from the Italian National Institute of Statistics (ISTAT) and included in the dataset. Specifically, we gathered data about population, surface and GDP for every Italian region and province for the respective period, which was then used to calculate the population density and GDP per capita, which are likely to have an impact on the choice of location of foreigners. The former is supposed to capture urban areas, where, by trend, criminal activity is elevated (Glaeser

and Sacerdote, 1999). Per capita income is an indicator of wealth as well as for the earning opportunities for migrants. Since we expect the level of migration to have an influence on the activity of foreign criminal organizations, we want to get an idea of the level of migration in the 20 regions of Italy and whether it has any influence on foreign organized crime. Thus, we have assembled data of residence permits over population for every province (ISTAT, 2016), but only for strangers of the nationalities that are explicitly used in the DIA documents. Please refer to Appendix A for a full list of nationalities. Finally, the dataset contains regional and provincial dummies to account for region- or province-specific factors.

The dataset with 1857 single operations was collapsed to a panel dataset with a province-year-structure. Criminal operations were summed up and divided by the respective province population in order to obtain a comparable variable for different regions. The socio-economic variables were kept identical according to the underlying province and year. Thereby, we have obtained a set of 404 observations. A panel structure of the data was chosen intentionally in order to deal with the problem of underreporting of criminal activity. Since criminal activities are off the record and cannot be documented entirely, the given DIA information on crime is only a subsample of total organized crime. It could be that there is a bias in our econometric estimates deriving from a correlation between the

determinants of criminal activity and the extent of underreporting. By using a panel structure to include two-way-fixed effects for geographical areas and years, we can bowdlerize constant measurement errors over time or across areas. Including fixed effects, and taking the logarithm of each variable, the observed data can then be used as an approximation for the true values (Ehrlich, 1996). The same approach applies also for migration data, where only official immigrants are reported, and specific characteristics of illegals could bias the estimates. Mastrobuoni and Pinotti (2012) show that there are significant differences in criminal activity of immigrants depending on their legal status. For both conditions, there are ambiguous effects. Theoretically, illegal immigrants face lower opportunity cost of crime due to fewer legitimate income opportunities and non-existent job protection for clandestine employment, whereas expulsion may deter criminal activity. Legal immigrants, on the other hand, have better labor market outcomes, but face a lower risk of expulsion from the country and thus lower opportunity cost of crime. Nevertheless, Bianchi et al. (2012) show that logarithms for both dependent and explanatory variables and fixed effects are effective to remove the induced measurement error. As for fixed effects, the regional fixed effects will be used in the regression due to the relatively short time frame of observations and thus small variations within provinces. As mentioned in the second section of this paper, we expect the competition level in criminal markets to affect the activities of foreigners. To measure the market concentration, we have generated an index that is comparable to the Herfindahl Hirshman index. Since we cannot measure

market shares of players in a specific criminal market, we have taken the number of arrested persons of each organization over all persons arrested in each observation. The resulting ratio of persons for each involved organization is used as a proxy for market share. The index is denoted *HH*, which ranges from zero, in case of perfect competition, to one for the case of only one player (comparable to a monopoly situation).

A condition for the construction of HH is a positive count of arrested persons, otherwise the index is not defined. This can be the case for police operations without arrest or for province-year-combinations in which no crime was detected. Within the dataset, we have noticed a zero count of persons in 83 out of 404 cases, corresponding to one fifth of the data. Hence, there are many empty observations, for which the factor "market concentration" cannot be applied arithmetically. However, assuming a value of zero for *HH* in those cases would bias the results of the regression since we would obtain a high concentration of data points at the origin of zero. We could alternatively create a competition indicator based on the count of operations instead of persons. However, we would obtain a critical mechanical correlation between the count of operations and the level of concentration. Such an indicator would be equal to zero for observations without detected crime and, more importantly, equal to one in cases, where only one operation took place and only one organization was involved. In case of cooperation though, there have to be at least two involved parties per operation, which results in the impossibility for *HH* to be equal to

one. This discontinuity of *HH* would dramatically amplify the negative effect of underreporting and measurement errors. By using a person-based indicator, we reduce the number of cases in which cooperation is deterministically reducing the level of market concentration and thus mitigate the described mechanical difficulty and negative effects. We have therefore decided to drop the mentioned cases and run our model with 321 observations, for which a count of arrested persons is available. By dropping observations from the dataset, we consciously condone a selection bias. As alternative measure, we will present the results of model with an assumed market concentration value that is equal to the average of the 321 given *HH*.

4 Model description

In order to capture the effect of market concentration and migration on criminal activity of foreigners and their behavior to cooperate, we are going to use an ordinary least squares (OLS) model. As controls for the coefficients, we are including fixed effects for the twenty Italian regions and for the four years of observation. Additionally, we are taking into account the socioeconomic factors that were presented in the previous section. Hence, our main estimating equation is

$$crime_{it} = \beta_1 HH_{it} + \beta_2 migr_{it} + \gamma' X_{it} + \varphi_i + \varphi_t + \varepsilon_{it}, \quad (1)$$

where $crime_{it}$ is the log of either foreign crimes or crimes, where cooperation between home and foreign groups took place, in region i during year t. The same notation applies

for the logged market concentration HH_{it}, and the logged migration rate $migr_{it}$. X_{it} represents our set of control variables, namely the logarithms of population density and per capita income. φ_i and φ_t are region and year fixed effects as control for unobserved factors that do not vary within areas or years, and ε_{it} is an error term. We have run a Breusch-Pagan test for heteroscedasticity, which came out positively. Therefore, we will use robust variance estimators when running the OLS regressions. Our main interest is to identify the β coefficients for the different crime operators.

5 Model evaluation

In the following section, we describe the regression outputs of our model and their implications. Moreover, we run some simple methods to control the robustness of our results.

5.1 Foreign Crime

After having rejected the distorting empty observations for *HH*, we want to analyze the effect of the explanatory variables on the occurrence of foreign crime. As previous literature elaborated, foreign crime tends to occur primarily in areas, where the level of migration is relatively higher. Furthermore, we have learned that the power of criminal organizations is based on criminal market control within an area. Hence, according to Hypothesis 1 we would expect a significant positive correlation between foreign organized crime and the immigration level, and a negative relationship with the regional level of competition.

Table 1 reports the output of an OLS regression with regional and year fixed effects on the count of foreign crime in columns (1)-(3) and on the number of involved persons in columns (4)-(6). The coefficients for every variable are consistent throughout different specifications. The estimators suggest that the number of foreign organized crime is significantly related to the occurrence of immigrants in the population. In accordance to previous studies, the results suggest that foreign groups do business in areas with a network of immigrants, where the liabilities of foreignness are lower. With a ten percent increase of the rate of immigrants, the number of foreign organized crimes increases by 0.9 percent. Furthermore, the hypothesis that foreigners are more active in regions with low market concentration is underpinned by the significant negative coefficients of *HH*. This behavior may be explained by foreigners' tendency to settle in northern Italy, where Italian organizations do not have monopolistic power and the market competition level is higher. However, it could also be the case that foreigners work on behalf of Italian organizations in the areas, where the latter are not sufficiently present but still want to penetrate the criminal market in the respective area.

Table 1: Regression output for foreign organized crime

VARIABLES	(1) fg_only	(2) fg_only	(3) fg_only	(4) fg_o_pers	(5) fg_o_pers	(6) fg_o_pers
migr	0.0876***		0.132***	0.185***		0.255***
	(0.0207)		(0.0486)	(0.0368)		(0.0850)
HH		-0.00381***	-0.00322***		-0.0103***	-0.00913***
		(0.000995)	(0.001000)		(0.00252)	(0.00245)
Constant	-0.0108	-0.00112	0.00337	-0.0275	0.00629	0.0150
	(0.0118)	(0.0133)	(0.0135)	(0.0286)	(0.0330)	(0.0330)
Observations	404	321	321	404	321	321
R-squared	0.324	0.254	0.347	0.304	0.265	0.335
GDP	yes	yes	yes	yes	yes	yes
popdens	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 Cooperative Criminal Operations

Other than for foreigners alone, the impact of the level of migration on cooperative operations is expected to be insignificant, because through cooperation, the obstacles of foreignness may be skirted. Regarding the account of market concentration, we have elaborated the hypothesis that a low concentration incentivizes the two criminal groups to cooperate in order to gain market power and generate higher profits. Thus, a significant negative correlation between the count of cooperation-crime and *HH* is expected. The output for the regressions on the occurrence of cooperation between home and foreign criminal organizations is presented in Table 2. In section 3 we have briefly described the complex of problems with an operation-based *HH* in case of cooperation and how it would

mechanically lead to lower concentration values for cooperative crimes. However, the results lie in a similar scope in the two tables.

Table 2: Regression output for cooperation

VARIABLES	(1) coop	(2) coop	(3) coop	(4) coop_pers	(5) coop_pers	(6) coop_pers
migr	0.0525***		0.0225	0.137***		0.0577
	(0.00926)		(0.0189)	(0.0244)		(0.0503)
HH		-0.00543***	-0.00533***		-0.0148***	-0.0146***
		(0.000714)	(0.000705)		(0.00194)	(0.00192)
Constant	0.0100	0.0377***	0.0385***	0.0308	0.117***	0.119***
	(0.00794)	(0.00924)	(0.00911)	(0.0206)	(0.0243)	(0.0240)
Observations	404	321	321	404	321	321
R-squared	0.287	0.388	0.394	0.266	0.362	0.368
GDP	yes	yes	yes	yes	yes	yes
popdens	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Other than expected, the estimator for *migr* suggests a significant positive impact on the incidence of crimes with cooperation. Hence, it appears that cooperation happens in areas with higher migrant level and is not a way for foreigners to substitute their migrant network in areas, where the ratio of immigrants is lower. In addition, there are reasonable illustrations for the positive correlation. For instance, Italian organizations could force foreigners into cooperation by threat of violence in cases where the latter could actually operate efficiently on their own (Aquilante and Maretto, 2016). Moreover, foreigners, even with existent migrant network, could deliberately choose to cooperate with Italians in

order to partake in an Italian organization's network for reasons such as logistics. As for *HH*, market concentration appears to be a better fitting explanatory factor for cooperative operation, as suggested by the considerably higher value of R^2. The coefficient, however, suggests more cooperative criminal operations in areas with a more fragmented criminal market. Hence, the output reinforces our hypothesis that a higher competition level is driving cooperation between Italians and foreigners. One evident reason is the lack of sufficient market power of the individual organizations to effectively penetrate a geographical area. On the other hand, it could be the case that Italian organizations force foreigners into cooperation, as mentioned above.

5.3 Robustness checks

After interpreting the results of our regressions, it is advisable to check for the robustness of our model in order to exclude unsoundness of our estimates. In avoidance of difficulties due to heteroskedascticity, we have used robust standard errors. Fixed effects were used to account for region- and year-specific factors. In this subsection, we want to proceed with further checks.

As a first measure to check the robustness of our results, we have run the same regressions with two different dependent variables. Instead of the count of criminal operations, we have taken the number of arrested people in each observation. By this variation, we can easily control for the validity of our estimation. For foreign organized crime, the previously

described outcome is robust to the control with the count of persons, as the three right regressions in Table 1 report quite similar coefficients and significance levels. It is noticeable that the magnitudes of migration and market concentration are bigger for involved persons than for the mere number of operations. For involved foreigners, the results portend a 1.9 percent higher count of persons with an increase of immigrants by ten percent[3]. As for cooperative crime operations, Table 2 reports only small disparities between the results, indicating robustness of our results.

In Section 3 we have shown the non-applicability of *HH* for operations, for which no number of arrested persons was given and indicated a selection bias after dropping the affected observations. In order to verify the methodology, we have taken the mean value of *HH* of all observations with available person counter and inserted it for the 83 cases, where *HH* was not defined. Thereby, we avoid turning points in the distribution of our sample. Table 5 and Table 6 present the regression outputs with $\overline{HH}$, the manipulated market concentration indicator. For both foreign organized and cooperative crime, the fact that the signs and significance levels are congruent affirms robustness of our results.

[3] This may suggest that foreigners conduct bigger operations in areas where immigration is high. We have checked the dataset with every operation listed separately and detected a non-significant positive correlation in the data for the count of crime-involved foreigners and the level of migration.

With respect to the mechanical correlation between *HH* and the count of operations, we have additionally run a regression with another manipulated sample. In addition to dropping the empty observations of persons, we have also cut the observations, where *HH* is equal to one, implying that no cooperation occurred. Moreover, we have generated another manipulated *HH* that contains only exclusive foreign- and home-group operations (denoted *HH_only*) and have run the regression on cooperative crime with it, resulting in similar results, confirming robustness to our model. Please refer to Table 7 and Table 8 in Appendix B to see the outputs.

6 Conclusion

We have found that foreign criminal organizations operate in regions, where Italian groups do not have outright market control. Furthermore, the network of other migrants appears to be an important factor for the local choice of market activity when foreigners work independently. In case of cooperation, we have discovered that organizations collaborate rather in areas with more migrant population and foreigners cannot substitute their migrant network by collaborating with Italian groups. Moreover, a higher market competition tends to incentivize both Italians and foreigners to collude.

Future research could elaborate an alternative measure to incorporate market concentration without selection bias. Moreover, since it is plausible that cooperation can originate

from both foreign and Italian groups, an approach to detect which side is effectively leading the association could create valuable insights in criminal organizations' strategies. Aquilante and Maretto (2016) have shown that Italians especially cooperate in businesses, where foreigners possess an input-based advantage (e.g. counterfeiting). Based on these findings, it could be of value to examine whether this specialization is also driven by other explanatory variables, for instance those used in this paper.

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Appendix A

Variables: Definitions and Sources

fg_only: logarithm of the count of operations, where exclusively foreign criminal organizations are involved over the total province population. Source: *Direzione Investigativa Antimafia*

fg_o_pers: logarithm of the count of arrested persons due to operations, where exclusively foreign criminal organizations are involved over the total province population. Source: *Direzione Investigativa Antimafia*

coop: logarithm of the count of operations, where both Italian and foreign criminal organizations are involved over the total province population. Source: *Direzione Investigativa Antimafia*

coop_pers: logarithm of the count of arrested persons due to operations, where both Italian and foreign criminal organizations are involved over the total province population. Source: *Direzione Investigativa Antimafia*

migr: logarithm of residence permits divided by the total province population, as of December 31 of each year. Source: Italian National Institute of Statistics.

HH: concentration in criminal markets. This variable is constructed as follows. First, the relative share of each criminal group's involvement per operation was calculated by divding the counter of persons by the number of involved groups. Then, in the panel dataset, the sum of shares was divided by the number of operations. The shares were raised to the second power and all summed up. Finally, the logarithm of the sum of squared relative shares of involvement in criminal operations was taken. Source: *Direzione Investigativa Antimafia*, own calculation.

GDP: logarithm of real gross domestic product per capita in each province and year. Source: Italian National Institute of Statistics.

popdens: logarithm of the province population over the province's surface. Source: Italian National Institute of Statistics

Countries included in construction of the migration variable: Albania, Bulgaria, China, Nigeria, Romania. Summarizing variables for North Africa, South America, Former

Yugoslavia and Former Soviet Union. In accordance to the documentation of *Direzione Investigativa Antimafia*

Appendix B

Table 3: Summary statistics, with trimmed sample

	Obs.	Mean	Std. Dev.	Min	Max
fg_only	321	0.0022	0.0037	0	0.0336
fg_only_pers	321	0.0048	0.0082	0	0.0771
coop	321	0.0018	0.0024	0	0.0136
coop_pers	321	0.0046	0.0064	0	0.0346
migr	321	0.0288	0.0143	0.0030	0.0997
HH	321	0.4921	0.1792	0	0.6932
GDP	321	9.9668	0.2738	9.3840	10.6054
popdens	321	11.5187	1.8846	5.5111	14.7755

Table 4: Correlation matrix of all variables, with trimmed sample

	Fg_only	Fg_o_pers	Coop	Coop_pers	Migr	HH	GDP	popdens
Fg_only	1							
Fg_o_pers	0.9181	1						
Coop	0.1101	0.0503	1					
Coop_pers	0.0923	0.0224	0.9501	1				
migr	0.3438	0.2925	0.3115	0.2678	1			
HH	-0.2257	-0.2400	-0.3985	-0.3797	-0.2913	1		
GDP	0.2211	0.2305	0.1866	0.1469	0.6755	-0.4149	1	
popdens	-0.2137	-0.1899	-0.2439	-0.2429	-0.1790	-0.0187	-0.1380	1

Table 5: Regression output for foreign organized crime, with manipulated HH

VARIABLES	(1) fg_only	(2) fg_only	(3) fg_only	(4) fg_o_pers	(5) fg_o_pers	(6) fg_o_pers
migr	0.0876***		0.107***	0.185***		0.193***
	(0.0207)		(0.0368)	(0.0368)		(0.0661)
$\overline{HH}$		-0.00508***	0.00241		-0.0126***	0.000950
		(0.000816)	(0.00236)		(0.00172)	(0.00439)
Constant	-0.0108	-0.0171	-0.0122	-0.0275	-0.0368	-0.0281
	(0.0118)	(0.0117)	(0.0117)	(0.0286)	(0.0290)	(0.0286)
Observations	404	404	404	404	404	404
R-squared	0.324	0.245	0.328	0.304	0.250	0.304
GDP	yes	yes	yes	yes	yes	yes
popdens	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Regression output for cooperation, with manipulated HH

VARIABLES	(1) coop	(2) coop	(3) coop	(4) coop_pers	(5) coop_pers	(6) coop_pers
migr	0.0525***		0.0356**	0.137***		0.0711*
	(0.00926)		(0.0163)	(0.0244)		(0.0388)
$\overline{HH}$		-0.00465***	-0.00214*		-0.0133***	-0.00833***
		(0.000574)	(0.00127)		(0.00145)	(0.00293)
Constant	0.0100	0.00972	0.0113	0.0308	0.0326	0.0358*
	(0.00794)	(0.00818)	(0.00796)	(0.0206)	(0.0206)	(0.0204)
Observations	404	404	404	404	404	404
R-squared	0.287	0.275	0.295	0.266	0.272	0.284
GDP	yes	yes	yes	yes	yes	yes
popdens	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression on cooperation, with perfect market concentration dropped

VARIABLES	(1) coop	(2) coop_pers
HH	-0.00388***	-0.00972***
	(0.00106)	(0.00283)
Constant	0.00391***	0.00999***
	(0.000514)	(0.00133)
Observations	228	228
R-squared	0.051	0.044
GDP	yes	yes
popdens	yes	yes
Region FE	yes	yes
Year FE	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Regressions on cooperation, with HH limited to exclusive foreign- and home operations

VARIABLES	(1) coop	(2) coop	(3) coop_pers	(4) coop_pers
migr		0.0218		0.0612
		(0.0206)		(0.0546)
HH_only	-0.00419***	-0.00388**	-0.00880**	-0.00794**
	(0.00153)	(0.00151)	(0.00392)	(0.00391)
Constant	0.0149	0.0152	0.0474*	0.0480*
	(0.00968)	(0.00964)	(0.0257)	(0.0256)
Observations	290	290	290	290
R-squared	0.299	0.306	0.239	0.247
GDP	yes	yes	yes	yes
popdens	yes	yes	yes	yes
Region FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1